

**FIRST FIVE-YEAR REVIEW REPORT FOR
ROCKAWAY BOROUGH WELLFIELD SUPERFUND SITE
MORRIS COUNTY, NEW JERSEY**



Prepared by

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
ICs	Institutional Controls
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
ROD	Record of Decision
RPM	Remedial Project Manager
TBC	To be considereds

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the first FYR for the Rockaway Borough Wellfield Superfund Site. The triggering action for this policy review is the April 15, 2015 Preliminary Close-Out Report.

The Site consists of four Operable Units (OUs). OU1 consisted of initial actions, including continued operation and maintenance by Rockaway Borough of liquid-phase granular activated carbon treatment of groundwater at municipal wells. OU2 addressed contaminated groundwater. OU3 addressed contaminated soils at the Klockner and Klockner (K&K) source area that presented an unacceptable risk and/or a source of contamination to the groundwater. OU4 addressed contaminated soils at the Wall Street/East Main Street (WS/EM) source area that presented an unacceptable risk and/or a source of contamination to the groundwater. All but OU1 are the subject of this FYR.

The Rockaway Borough Wellfield Superfund Site FYR was led by Brian Quinn, Remedial Project Manager (RPM). Participants included Urszula Filipowicz, risk assessor, Kathryn Flynn, hydrogeologist, Michael Clemetson, ecological risk assessor, and Patricia Seppi, community involvement coordinator.

Site Background

The Rockaway Borough Wellfield Site (Site) is located in Rockaway Borough in Morris County, New Jersey (Figure 1). Rockaway Borough is situated in the center of Morris County, approximately 10 miles north of Morristown and 20 miles northwest of Newark in the north-central portion of the state. The Site is located in a suburban residential setting and is surrounded by homes, businesses, and municipal property. The Borough of Rockaway's municipal wells supply potable water to about 11,000 people.

The Rockaway Borough Wellfield Superfund Site includes three municipal water supply wells (Nos. 1, 5, and 6), which are located off Union Street in the eastern section of the Borough. The groundwater at the municipal water supply wells was impacted primarily with tetrachloroethene (PCE) and trichloroethene (TCE). The three municipal water supply wells are located in an aquifer designated as the sole source aquifer for Rockaway Borough and the surrounding communities. The wells are approximately a quarter mile to the south-southeast of the Rockaway River, which runs through the Borough.

Based on early site investigations, the suspected sources of the TCE and PCE contamination included industrial and commercial operations within the Borough, including the K&K facility and the Wall Street/East Main Street area (Figure 2). The Klockner & Klockner (K&K) Source Area (Figure 3) is a

portion of the larger Rockaway Borough Wellfield Superfund Site. Operations at the K&K Source Area included metal machining as well as the manufacturing of rocket components. The K&K Source Area is currently a primarily light industrial area in northwest Rockaway Borough. A Metal fabrication facility and a landscaping company currently operate on the K&K source area property.

A number of past activities contributed to the contamination found at the WS/EM Source Area including, but not limited to, dry cleaning activities and automotive repairs. The WS/EM Source Area is primarily comprised of diverse businesses in a commercial area in the heart of downtown Rockaway Borough, Morris County, New Jersey.

In December 1982, the site was placed on EPA’s National Priorities List of Superfund Sites.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Rockaway Borough Wellfield Superfund Site		
EPA ID:		
Region: 2	State: NJ	City/County: Morris
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	Has the site achieved construction completion? No	
REVIEW STATUS		
Lead agency: EPA <i>[If “Other Federal Agency”, enter Agency name]:</i>		
Author name (Federal or State Project Manager): Brian Quinn		
Author affiliation: USEPA		
Review period: 4/15/2015 - 4/14/2020		
Date of site inspection: 10/4/2019		
Type of review: Policy		
Review number: 1		
Triggering action date: 4/15/2015		
Due date (five years after triggering action date): 4/15/2020		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

The presence of VOC contamination in the groundwater caused the Borough of Rockaway to construct a three-bed granular activated carbon adsorption treatment system to treat the municipal water supply. The system began operating in July 1981, treating approximately 900,000 gallons per day of contaminated groundwater pumped from the Borough's wells. Under a cooperative agreement with EPA, NJDEP initiated a Remedial Investigation/Feasibility Study (RI/FS) to determine the nature and extent of contamination. The RI/FS utilized a soil gas survey that identified three potential source areas within the Borough, although the horizontal and vertical extent of groundwater and soil contamination was not fully defined.

Based on these findings, EPA initiated a Phase II RI/FS to identify the potential sources of the groundwater contamination. This Phase II RI/FS was performed from September 1989 – October 1990 and included collection and analysis of numerous soil and groundwater samples that identified the sources of three contaminated groundwater plumes. Some of the major findings and conclusions of the Phase II RI/FS were as follows:

- PCE-contaminated groundwater emanating from the Wall Street/East Main Street (WS/EM) Source Area was impacting municipal wells No. 1 and 5;
- TCE-contaminated groundwater emanating from the K&K property was impacting municipal well No. 6; and
- Site related VOC-contaminated groundwater was present in the Roned Realty Industrial Area (an industrial park in Rockaway Borough).

A risk assessment was conducted as part of the groundwater RI/FS and addressed potential human health impacts associated with domestic use of untreated groundwater from the Rockaway Borough Well field. Results of the risk assessment indicated unacceptable cancer risk and noncancer hazard for future residents from consumption of PCE and TCE contaminated groundwater.

During the remedial investigations and feasibility studies for source areas (K&K and EM/WS), the nature and extent of the soil contamination was assessed through sampling of soils adjacent to and below the buildings in these areas. TCE, PCE and lead are the primary contaminants that exceeded health risk screening levels at the K&K Source Area. PCE is the primary contaminant that exceeded health risk screening levels at the WS/EM Source Area.

Response Actions

On September 29, 1986, at the conclusion of the NJDEP RI/FS, EPA issued a Record of Decision (ROD) for the first operable unit. The ROD called for the continued use of the existing carbon treatment system operated by Rockaway Borough, and directed the commencement of a supplemental RI/FS in order to identify the groundwater contaminant source(s), further delineate the full extent of the contamination, and evaluate additional remedial action alternatives to address those sources of groundwater contamination.

On September 30, 1991, EPA issued a ROD selecting a remedy for OU2 (contaminated groundwater), which addressed the VOC plumes in groundwater that are migrating to the Borough Wellfield. The selected remedy called for:

- Extraction of contaminated groundwater and restoration of the groundwater to drinking water standards;
- Treatment of extracted groundwater to levels attaining drinking water standards;
- Reinjection of treated groundwater;
- and Appropriate environmental monitoring to ensure the effectiveness of the remedy.

The goal for the cleanup of the groundwater was to restore the groundwater to the MCLs.

The OU2 ROD also directed further investigation to identify and fully delineate the source areas of the groundwater contamination. In 1994, EPA entered into a Consent Decree with Alliant Techsystems (ATK), a Potentially Responsible Party (PRP) for the K&K groundwater plume, requiring ATK to undertake the Remedial Design (RD) for both contaminated groundwater plumes that comprise OU2 of the Rockaway Borough Wellfield site, and to perform the Remedial Action (RA) for the K&K contaminated groundwater plume.

In 2003, EPA began a RI/FS with respect to the WS/EM Source Area (OU4) which was completed in August 2006. A ROD was issued by EPA on September 29, 2006 that called for:

- Excavation of an estimated 40 cubic yards of soil contaminated with volatile organic compounds;
- Off-site treatment and/or disposal; and
- Soil Vapor Extraction (SVE), if necessary to augment the soil excavation.

The RAO for the contaminated soil at the WS/EM Source Area was to, “reduce the potential for further migration of PCE from the contaminated soil into groundwater.” The remediation goal for PCE in soil was identified from the New Jersey Impact to Groundwater Soil Criteria and is 1 mg/kg.

On September 27, 2007 the OU3 ROD was issued by EPA. The selected OU3 remedy included:

- Soil Vapor Extraction (SVE) of soil contaminated with volatile organic compounds (VOCs) at the Building 12 property;
- Excavation and off-site treatment and/or disposal of an estimated 150 cubic yards (yd³) of VOC contaminated soil at the Building 13 property;
- and Excavation and off-site treatment and/or disposal of an estimated 27 yd³ of soil lead located near Building 12.

The RAOs for the contaminated soil at the K&K Source Area were to:

- Reduce the potential for further migration of TCE and PCE from the contaminated soil into groundwater.
- Remove Direct Contact exposure to lead-contaminated soil.

The Remediation Goal (RG) for TCE and PCE in soil was derived from the New Jersey Impact to Groundwater Soil Criteria and is 1 mg/kg for each of these contaminants. The RG for lead in soil was derived from the NJDEP Residential Direct Contact Criteria of 400 mg/kg.

On March 23, 2015, an Explanation of Significant Differences (ESD) was issued by EPA. The ESD described the decision to have two separate groundwater extraction and treatment systems instead of one; one for the K&K plume and one for the EM/WS plume, and also described the modification of the discharge of the treated groundwater to surface water rather than reinjection, as described in the OU2 ROD. Also, the ESD clarified and rectified accounting records to change the operable unit designation for the WS/EM source area from OU3 to OU4.

Status of Response Actions

OU1

Since 1981, the Borough has been utilizing a GAC treatment system for water treatment. This system was augmented with an air stripper a few years later and is effectively treating the water to drinking water standards prior to distribution.

OU2

Two RDs were completed to address the groundwater contamination (OU2). The K&K design was completed by ATK in July 2005 and the WS/EM design was completed in May 2005. ATK began operation of the groundwater treatment system in January 2006 and it continues to operate. EPA completed the RD for the WS/EM plume and began operation of the separate groundwater extraction and treatment system for the WS/EM contaminated groundwater plume in November 2010.

OU3

The initial extent of the VOC contamination in the vicinity of Building 13 was approximately 775 square feet at a depth of 5 feet. Total soil excavated from this area was 27 cubic yards, which was disposed off-site at an EPA approved disposal facility. Approximately 150 cubic yards of lead-impacted soil on the Building 12 property were excavated and disposed of at an EPA approved disposal facility. The source area excavation and off-site disposal of VOC-contaminated soil at the Building 13 property and excavation and off-site disposal of lead-contaminated soil located near Building 12 occurred from February to June 2013.

The construction of the SVE system was completed in June 2013. To address the remainder of the contaminated soils in the Building 12 property, 12 soil vapor extraction wells were installed inside Building 12. The SVE system operated from 2013-2015 and removed approximately 25 pounds of VOCs. Soil sampling after operation of the SVE system showed that the SVE system had met the goals of the ROD. However, due to elevated soil vapor levels in one of the soil vapor extraction wells nearest extraction well one (EW-1), there is a potential threat of vapor intrusion inside the building. Upon review of the SVE well and groundwater monitoring well data, the source of the soil vapors could not be definitively linked to soil or groundwater. The PRP is currently working with EPA to install a subslab depressurization system to address the potential vapor intrusion pathway. The conversion of the SVE system to a subslab depressurization system will be addressed by an ESD to the 2007 ROD.

OU4

The WS/EM source area construction occurred from October 2009 to February 2010 and the system began operation in February 2010.

The September 2006 ROD identified PCE contaminated soils within the 2 Wall Street property area as a source of groundwater contamination at the Site and selected a remedial action that included the excavation and off-site disposal of contaminated shallow soil and installation of a SVE system to address deeper contamination. The RA was implemented between October 2009 and February 2010 and the SVE system is currently operating.

Although approximately 50 cubic yards of soil was removed and remaining soil contamination has been addressed by the remedial action in the subsurface down to approximately 30 feet bgs, elevated contaminant concentrations have been detected in the groundwater in monitoring well MW-1A. Based on the elevated contaminant concentrations, it was determined that some in-situ injections and the installation of an expanded SVE system would be required to fully remediate the EM/WS source area remedy. This work is planned to be initiated in the fall of 2020. The justification for the expanded SVE system will be addressed by an ESD to the 2006 ROD.

EPA is currently conducting an investigation of vapor intrusion into structures located above the contaminated groundwater plumes that could be potentially affected by the associated vapors, and will implement appropriate measures based on the investigation results. These measures may include a subslab ventilation system, if appropriate.

Implementation of Institutional Controls: Currently, goals for the cleanup of the groundwater and restoration of the aquifer as called for in the OU2 ROD have not been reached. Therefore, it is recommended that a Classification Exception Area be established for the site to ensure that no wells are installed in the contaminated groundwater plume.

IC Summary Table

Table 1: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	No	Sitewide	Restrict installation of groundwater wells and groundwater use.	Classification Exception Area

Systems Operations/Operation & Maintenance

OU2 East Main Street/Wall Street Portion

The remedy involves pumping groundwater from five extraction wells through 2- to 4-inch diameter double-containment high-density polyethylene forcemains into the treatment building. The influent water treatment train consists of a bag filter, low-profile air stripper; the vapor from the air stripper is treated by a vapor phase carbon system before being discharged to the atmosphere. The treated water is gravity-discharged through an 8-inch PVC storm sewer pipe to an existing storm sewer manhole located near the building. The existing storm sewer pipe at the connection point is reinforced concrete pipe and subsequently outfalls to the Rockaway River. Plant systems are monitored remotely by computer to

ensure system is running efficiently. Extraction well rates are adjusted to optimize the removal of groundwater contamination.

Monitoring of the groundwater is accomplished by semi-annual sampling of approximately 35 monitoring wells.

OU2 Klockner & Klockner Groundwater Portion

Extracted water from groundwater extraction wells EW-1 and EW-4 is pumped via forcemain to a treatment building, which houses a low-profile air stripper along with ancillary mechanical and electrical components. Following treatment, the treated water discharges by gravity to a nearby existing storm sewer that outfalls to the Beaver Brook, which feeds into the Rockaway River.

Monitoring of the groundwater is accomplished by semi-annual sampling of approximately 30 monitoring wells.

Operation and Maintenance plans will be updated for the OU3 Klockner and Klockner Source Area and OU4 East Main Street/Wall Street Source Area following changes to the remedies discussed in the 2020 ESD.

Potential site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the site.

III. PROGRESS SINCE THE LAST REVIEW

This is the first five-year review for this site.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On October 1, 2019, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York, New Jersey, Puerto Rico, and the U.S. Virgin Islands including the Rockaway Borough Wellfield site. The announcement can be found at the following web address: <https://www.epa.gov/aboutepa/fiscal-year-2020-five-year-reviews>. In addition to this notification, a public notice was made available by the site community involvement coordinator by posting on the Rockaway Borough webpage, on 2/14/2020, stating that there was a FYR and inviting the public to submit any comments to the U.S. EPA. The results of the review and the report will be made available online at: <https://www.epa.gov/superfund/rockaway-boro-wellfield> and at the Site information repository located at Rockaway Borough Public Library, 82 Main Street, Rockaway, NJ 07866.

Data Review

OU2 Groundwater Data

The OU2 EM/WS monitoring network includes 49 monitoring wells, five extraction wells, and the three municipal wells. The well network extends from the OU4 source area downgradient to the municipal

pumping wells and the OU3 K&K area, and they are screened in all levels of the glacial aquifer. Wells are sampled quarterly for VOCs.

PCE is the main contaminant of concern in the OU2 EM/WS plume and TCE and other VOCs are also detected at low concentrations. In 2018, PCE results exceeded the standard of 1 µg/l at 26 of 35 monitoring wells and all of the extraction wells (Figure 2). In the 2018 monitoring events, the maximum concentration of PCE was 161,000 µg/l at well MW-1A in the OU4 source area. At extraction well EW-5A near the source area, the maximum PCE concentration in 2018 was 1,660 µg/l in 2018. TCE exceeded the NJDEP drinking water standard of 1.0 µg/l at wells MW-1A (134,000 µg/l) and EW-5A (527 µg/l).

Figure 3 shows the PCE plume model from April 2011 compared to 2015-2018 models. The highest PCE concentrations at MW-1A in the OU4 source area have not declined due to pumping at EW-5. The areas around EW-8, EW-9, and EW-10 do show that the extraction wells removed significant PCE mass from the plume since 2011. PCE concentrations have showed significant decreasing trends at 14 wells, and concentrations were stable or below detection at 21 wells (based on statistical trend analysis). Three monitoring wells in the PZ-10 and PZ-11 well clusters show increasing trends, but the concentrations are variable. These wells may represent areas of the plume that are not captured by the EW-10 extraction well or may be influenced by seasonal variation and municipal well pumping cycles.

The monitoring results from the municipal wells show variation related to periods when the wells are out of service. Two of the three wells met the remediation goal in 2017, but shutdown of the wells for maintenance caused rebounding concentrations at GW-1 in 2018. Concentrations may continue to decline as routine operating conditions are maintained.

Regional groundwater flow is generally parallel to the river valley from southwest to northeast, but the EM/WS extraction wells and the municipal well field control groundwater flow in the area of the plume to ensure capture of the contaminant plume. The water levels in the OU2 EM/WS network can vary several feet due to cyclical pumping at municipal well GW-5. In 2011, groundwater elevations across the OU2 EM/WS area were unusually high due to precipitation and flooding associated with Hurricane Irene. The influx of recharge from the northern uplands area of the site caused a change in the shallow flow direction toward to the south. Elevations decreased from January 2012 to December 2012, stabilized to gradually fluctuating groundwater elevations during 2013 and 2014, and seemed to decrease slightly through 2018.

Quarterly monitoring events include measurements of nested well pairs to evaluate vertical flow and measurements of surface water elevations to constrain flow around Foxes Pond and the Rockaway River. Wells MW-1D/1R at the source area have shown upward gradients since 2014 after extraction rates were optimized and the extraction rate at EW-5A increased.

At the OU2 K&K plume, eleven monitoring wells and two extraction wells are sampled annually according to the 2006 Final Operation and Maintenance Plan. TCE is the contaminant of concern for the K&K plume, and it is the only compound consistently detected above the 1.0 µg/l NJDEP drinking water standard. In 2018, TCE was above the NJDEP standard at 9 of the 13 sampled wells (Figure 4). TCE concentrations at the K&K wells have generally been stable or decreasing since 2006 when pumping started at the extraction system. In 2018, the maximum detected concentration for TCE was 120 µg/l at MW-2D. This was the lowest TCE value recorded at this location. TCE concentrations at MW-3D had been increasing from 2006 to 2014, possibly due to its close proximity to the extraction

well EW-1. The SVE system operation in 2013-2014 seems to have contributed to a decline in TCE concentrations starting in 2015. Before the K&K system started pumping, groundwater flowed southwest toward the municipal pumping wells. Groundwater flow is now directed to the extraction wells EW-1 and EW-4.

OU3 Klockner and Klockner Soil Vapor Extraction System

The SVE system start-up was initiated in June 2013 and the SVE system was operated for approximately 20 months including rebound testing operations. It was shut down in February 2015 and removed approximately 25 pounds of VOCs. Based on the results of the rebound testing, which confirmed that the NJDEP soil criteria had been met, confirmatory soil sampling and laboratory analysis were conducted in February 2015 to verify that the soil remediation goal (RG) identified in the ROD had been met. The results of the soil sampling confirmed that chlorinated volatile compounds (CVOC) concentrations in the targeted vadose zone soil had been reduced to levels below the RG of 1 mg/kg.

Sub-slab vapor sampling conducted at the Building 12 Property in March 2016 and March 2017 in accordance with the NJDEP Vapor Intrusion Guidance indicated the presence of trichloroethylene (TCE) concentrations in one soil vapor extraction wells above the water table that exceeded NJDEP & EPA soil gas screening criteria. CVOC concentrations in indoor air samples were at or below NJDEP & EPA nonresidential soil gas screening criteria. A comprehensive review of the SVE well and groundwater monitoring well data has been conducted, but the source of the soil vapors cannot not be definitively linked to soil or groundwater contaminants. A source area in the vicinity of the impacted well has not been found in the remedial investigations for OU2 or OU3 to date. However, in order to allow for completion of the remedial action for OU3, it has been agreed by the EPA and the PRP to convert the SVE system into a sub-slab depressurization system to remove the risk pathway related to the soil gas impacts above the water table.

OU4 East Main Street/Wall Street Soil Vapor Extraction System

Approximately 506,080 pounds of PCE and 509,260 pounds of total VOCs have been removed from the subsurface to date through the operation of the SVE system at the EM/WS properties. The SVE system currently removes approximately one pound of PCE per month. Since the contaminant source is located below the water table, EPA is planning an enhancement of the current SVE system to address the vadose zone and shallow groundwater contamination and allow for completion of the SVE for OU4. The SVE enhancement will include injections to break down the contamination in the vadose zone as well as the groundwater. The injections will also increase the efficiency and effectiveness of the SVE system in capturing and treating the vapors.

Site Inspection

The inspection of the Site was conducted on 10/4/2019. In attendance were Brian Quinn, EPA RPM, Kathryn Flynn, EPA Hydrogeologist, Urszula Filipowicz, EPA Risk Assessor. The purpose of the inspection was to assess the protectiveness of the remedy. All facilities appeared in good condition and have been maintained in accordance with the Operation & Maintenance plans. The wells are secure, accessible and well maintained. The fence around the treatment systems is secure.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

The remedies called for in the 1986, 1991, 2006 and 2007 RODs are operating effectively.

OU2

During the design of the remedy called for in the 1991 ROD, the PRP conducted a hydrogeological study. The results of the study led to a determination that the two plumes emanated from separate sources. It was determined that the WS/EM and K&K plumes should be addressed separately, with two separate extraction and treatment systems. The K&K groundwater and extraction system has been operational by PRPs since December 2005. Overall, the concentrations have decreased significantly except in the WS/EM source area. The WS/EM groundwater and extraction system has been operational since November 2011 and EPA will operate the system until 2022 when NJDEP will assume operation of the system.

OU3

The K&K source area remedy included the operation of an SVE system, excavation and off-site disposal of 150 cubic yards of VOC-contaminated soil at the Building 13 property and excavation and off-site disposal of 27 cubic yards of soil contaminated with lead located near Building 12. The SVE system has met its goals and the PRPs are working to closeout the remedial action.

OU4

The WS/EM source area remedy included the excavation of 40 cubic yards of contaminated soils and the operation of an SVE system to address the WS/EM source area contamination. EPA is continuing to operate the SVE system and has completed a design that will optimize the SVE system by augmenting it and adding injections to treat the contamination in the vadose zone and groundwater. The injections will enhance capture of the vapors with the optimized SVE system. An ESD will document this change.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Sitewide:

There have been no physical changes to the Site that would adversely affect the protectiveness of the remedy. The exposure assumptions and the toxicity values that were used to estimate the potential risks and hazards to human health followed the general risk assessment practice at the time the risk assessment was performed. Although the risk assessment process has been updated and specific parameters and toxicity values may have changed, the risk assessment process that was used is still consistent with current practice and the need to implement a remedial action remains valid.

OU2

A risk assessment was conducted as part of the OU2 ROD and addressed potential human health impacts associated with domestic use of untreated groundwater from the Rockaway Borough Well field. Results

of the risk assessment indicated unacceptable cancer risk and noncancer hazard for future residents from consumption of PCE and TCE contaminated groundwater.

The selected remedial action in the OU2 ROD called for pumping and treating of contaminated groundwater for restoration of the aquifer. An ESD, issued in 2015, modified the selected remedy for the groundwater by calling for two separate groundwater extraction and treatment systems to address contamination emanating from the K&K and EM/WS source areas, with surface water discharge of the treated groundwater instead of reinjection.

The remedial action objective identified in the 1991 OU2 ROD was to restore the groundwater to meet the more stringent of Federal and State MCLs which have been developed to protect human health. This objective and the remediation goals are valid and protective of human health. Since everyone in the vicinity of the site is connected to the public water supply which is treated before distribution, direct exposures related to potable use of groundwater continue to be an incomplete exposure pathway.

OU3:

The 2007 OU3 ROD addressed the remediation of the identified contaminant source in the soil at the K&K source area that is adversely impacting the underlying groundwater. The risk assessment for this OU concluded that cancer risks and noncancer hazards for the receptors most likely to encounter contaminated site soils (i.e., commercial industrial workers) were within or below EPA's threshold values. However, the decision document noted that the concentrations of TCE and PCE at Building 12 and 13 were above concentrations associated with an adverse impact (i.e., a continuing source) to groundwater. Further, the noncancer HI for the hypothetical future child resident from ingestion of TCE-contaminated soil of 2 slightly exceeded EPA's threshold value of 1. Although given current and anticipated future land use, exposure to this receptor is highly unlikely, the noncancer hazard calculation further supported the need for a remedial action at the site.

The risk assessment also noted that lead was found in soil adjacent to Building 12. The maximum on-Site concentration of lead found (841 mg/kg) exceeded the NJDEP residential and industrial screening values for lead of 400 and 800 mg/kg, respectively. However, the average concentration of 174 mg/kg across the Site did not. Nonetheless, EPA decided to take an action due to the limited volume of lead contaminated soil present (approximately 27 cubic yards), and to avoid the need for institutional controls at the site.

To address the contamination found at the site, the OU3 ROD called for the excavation and off-site treatment/disposal of VOC contaminated soil at Building 13. In addition, the decision document called for the installation of an SVE system at Building 12 and the excavation of lead contaminated soils near this building. Excavation of lead contaminated soils along with the use of the SVE system to treat VOCs in soils effectively ensures that direct contact exposures by nearby receptors are an incomplete exposure pathway.

The RAOs for the contaminated soil at the K&K source area were to reduce the potential for further migration of TCE and PCE from the contaminated soil into groundwater and to remove direct contact exposure to lead-contaminated soil. The cleanup goal for TCE and PCE in soil is 1 mg/kg for each contaminant and was based on New Jersey impact to groundwater soil criteria. These cleanup criteria are below NJ's current residential direct contact soil remediation standards for TCE and PCE and therefore remain protective of human health. The cleanup goal for lead in soil of 400 mg/kg was based on NJ's health based residential screening value at the time. The cleanup goal for lead is consistent with

the current Regional lead approach which states that no point in the exposure area shall exceed 400 mg/kg, nor can the average across the area post cleanup exceed 200 mg/kg. Hence, the lead cleanup goal is protective of human health.

OU4:

The final operable unit for the site, OU4, addresses the remediation of the identified contaminant source in soil at the WS/EM source area that is adversely impacting groundwater. The risk assessment conducted as part of the RI for this OU concluded that although risks and hazards associated with soil exposure via direct contact (ingestion, dermal contact and inhalation) were within or below EPA's threshold criteria, concentrations of PCE in soil were above those associated with an adverse impact to groundwater and hence a remedial action was warranted. To ensure the source area does not serve as an ongoing source to the groundwater contamination, the 2006 OU4 ROD called for the excavation and off-site disposal of approximately 40 cubic yards of PCE contaminated soil and if necessary, operation of a SVE system to augment the soil excavation.

The RAO for the contaminated soil at the WS/EM source area is to reduce the potential for further migration of PCE from contaminated soil into groundwater. This RAO remains valid and the remediation goal for PCE in soil of 1 mg/kg remains protective of human health.

Vapor intrusion (Sitewide)

Because soils and groundwater at the site are contaminated with VOCs, EPA initiated a vapor intrusion (VI) investigation in overlying buildings in 2006. To date, approximately 70 structures consisting of mostly residential structures, a school and several commercial/industrial buildings near the source areas have been sampled to ensure that vapors emanating from the site are not adversely affecting indoor air quality. EPA continues to periodically sample approximately 25 residences overlying the site plumes to ensure that this pathway remains incomplete. To date no sub-slab systems have been installed by EPA. However, for the Klockner & Klockner Building 12 property, a sub-slab depressurization system is being installed to complete the OU3 remedial action. In summary, EPA's VI investigation is ongoing since VOCs remain in groundwater above health-based screening values and will continue to be evaluated in future five-year reviews.

Although the ecological risk assessment screening and toxicity values used to support the various decision documents (1986, 1991, 2006, 2007, 2015) may not necessarily reflect the current values, the soil excavation and soil vapor extraction system have reduced any potential risk from surface soil contaminants to terrestrial receptors. The Screening Level Ecological Risk Assessment conducted in 2004 indicated that since there is a lack of ecological habitat and the majority of the observed soil concentrations were comparable to background, risks to ecological receptors were deemed to be low.

QUESTION C: Has any **other** information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
<i>OU3 and OU4</i>

Issues and Recommendations Identified in the Five-Year Review:
--

OU(s): OU2	Issue Category: Remedy Performance			
	Issue: No institutional control in place to prevent the use of groundwater.			
	Recommendation: Establish a Classification Exception Area.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	State	EPA	9/30/2021

VII. PROTECTIVNESS STATEMENT

Protectiveness Statement(s)		
<i>Operable Unit:</i> 2	<i>Protectiveness Determination:</i> Short-term Protective	<i>Planned Addendum Completion Date:</i> Click here to enter a date
<i>Protectiveness Statement:</i> The OU2 remedy is protective of human health and the environment in the short term because all exposure pathways have been addressed. In order to be protective in the long term, an institutional control in the form of a Classification Exception Area to prevent use of groundwater is needed.		

Protectiveness Statement(s)		
<i>Operable Unit:</i> 3	<i>Protectiveness Determination:</i> Protective	<i>Planned Addendum Completion Date:</i> Click here to enter a date
<i>Protectiveness Statement:</i> The OU3 remedy is protective of human health and the environment.		

Protectiveness Statement(s)		
<i>Operable Unit:</i> 4	<i>Protectiveness Determination:</i> Protective	<i>Planned Addendum Completion Date:</i> Click here to enter a date
<i>Protectiveness Statement:</i> The OU4 remedy is protective of human health and the environment.		

Sitewide Protectiveness Statement	
<i>Protectiveness Determination:</i> Short-term Protective	<i>Planned Addendum Completion Date:</i> Click here to enter a date
<i>Protectiveness Statement:</i> The remedies are protective of human health and the environment in the short term because all exposure pathways have been addressed. In order to be protective in the long term, an institutional control in the form of a Classification Exception Area to prevent use of groundwater is needed.	

VIII. NEXT REVIEW

The next FYR report for the Rockaway Borough Wellfield Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

Record of Decision Sitewide	September 1986
Record of Decision OU2	September 1991
Record of Decision OU4	September 2006
Record of Decision OU3	September 2007
Explanation of Significant Difference	March 2015
Annual Reports (Klockner & Klockner)	2014-2018
Annual Reports (East Main/Wall Street)	2014-2018
Vapor Intrusion Sampling Data	2006-2012

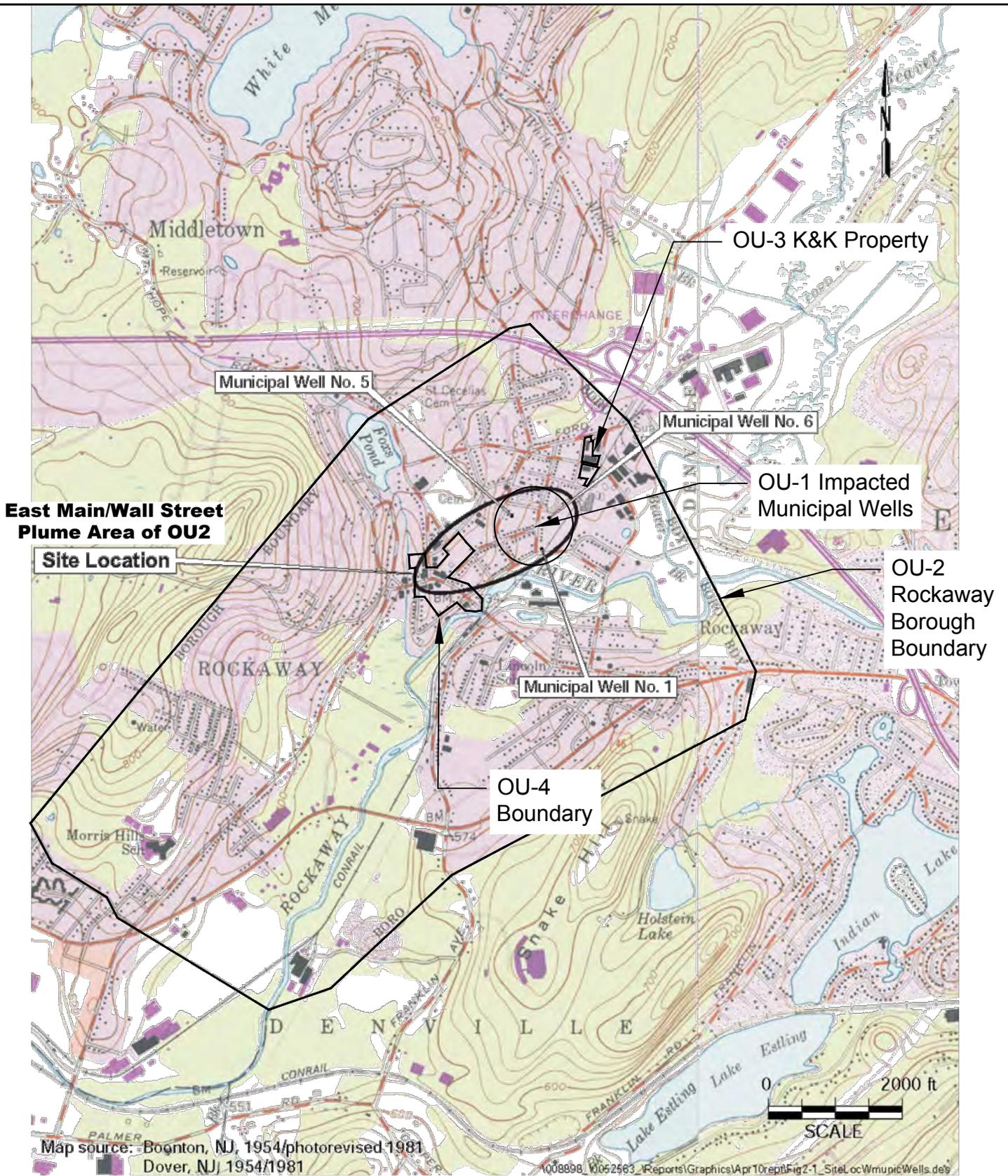
APPENDIX B

Site Map

East Main Street/Wall Street PCE concentration map

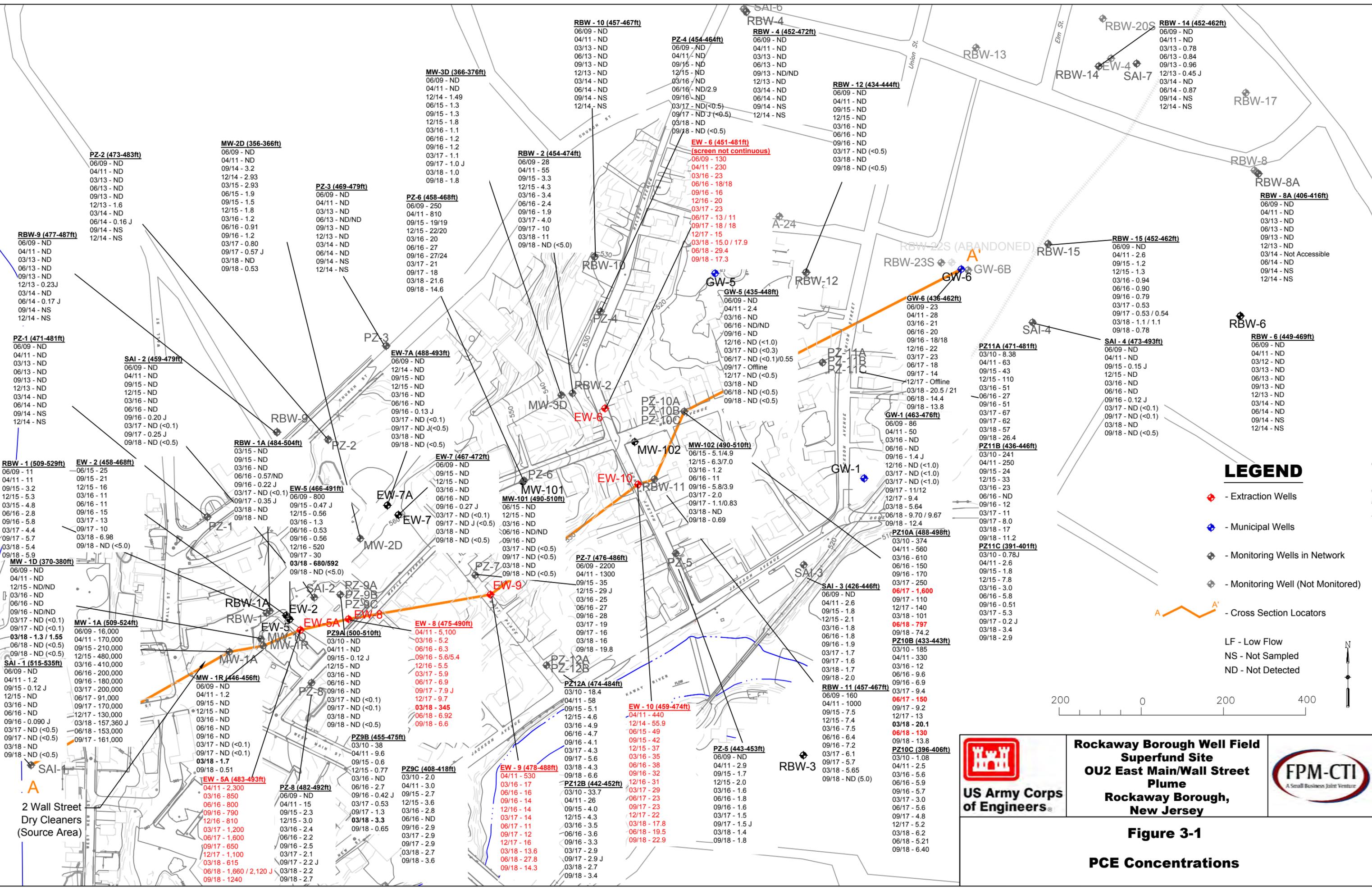
East Main Street/Wall Street PCE flow net maps

Klockner and Klockner TCE plume map



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Figure 1-1
Site Location



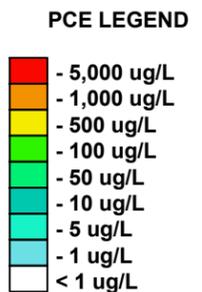
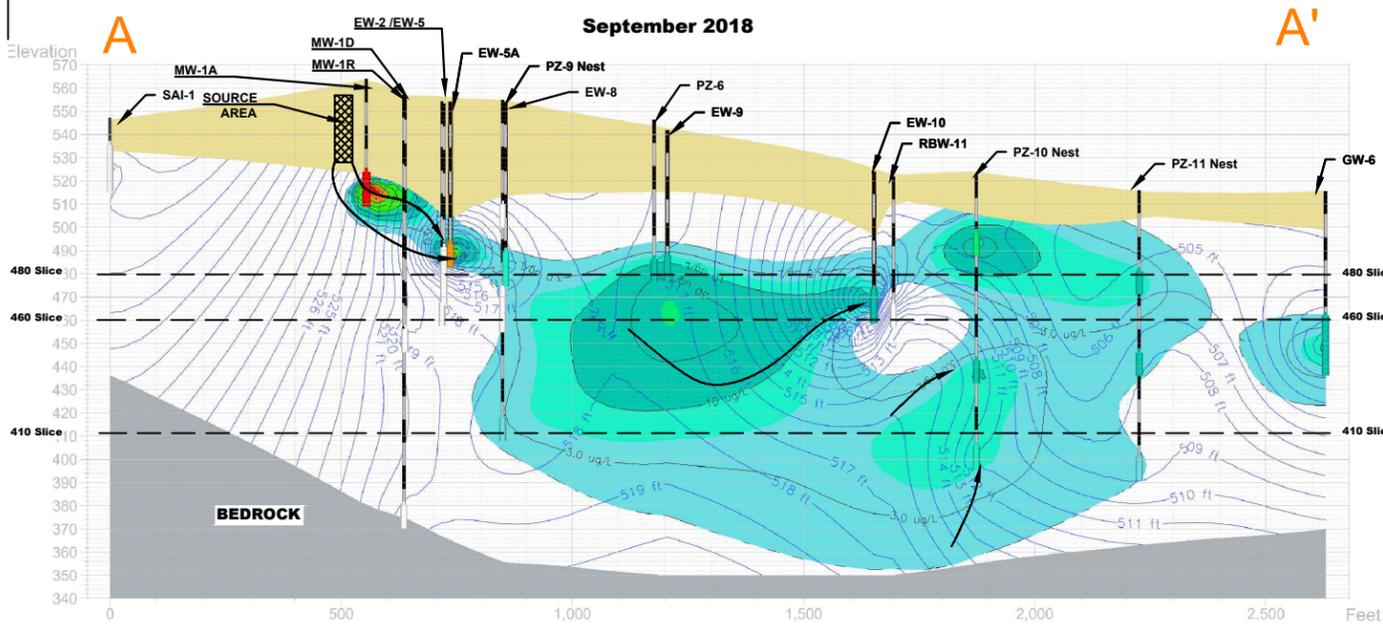
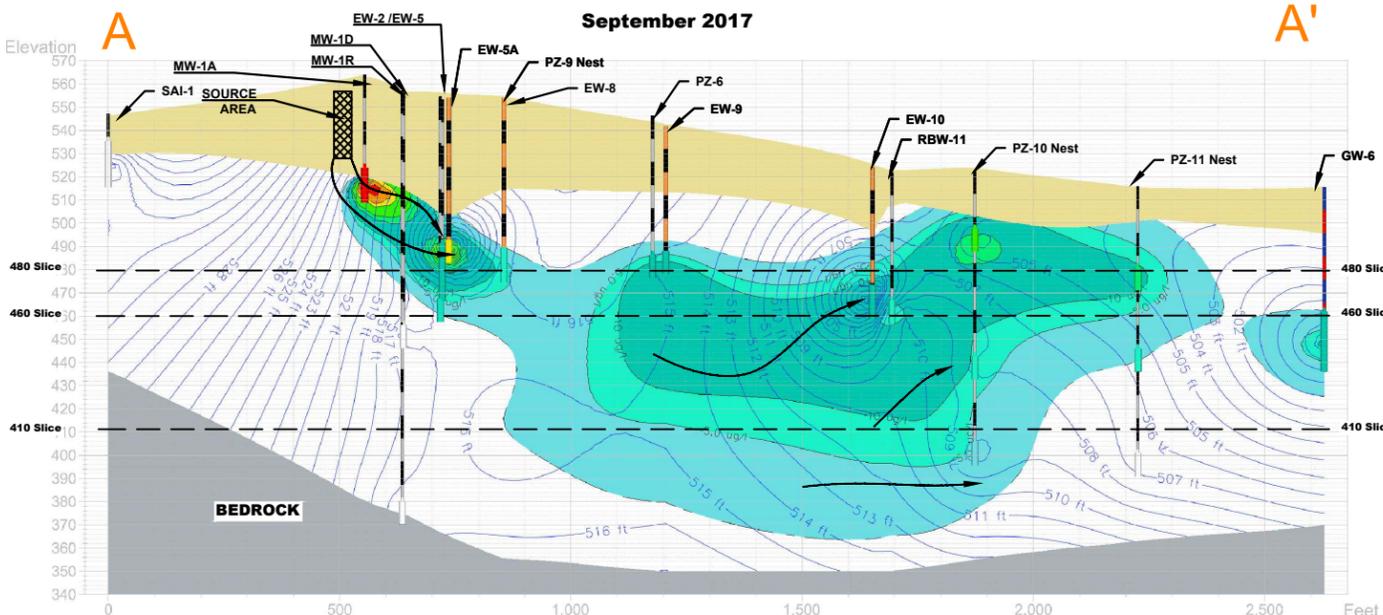
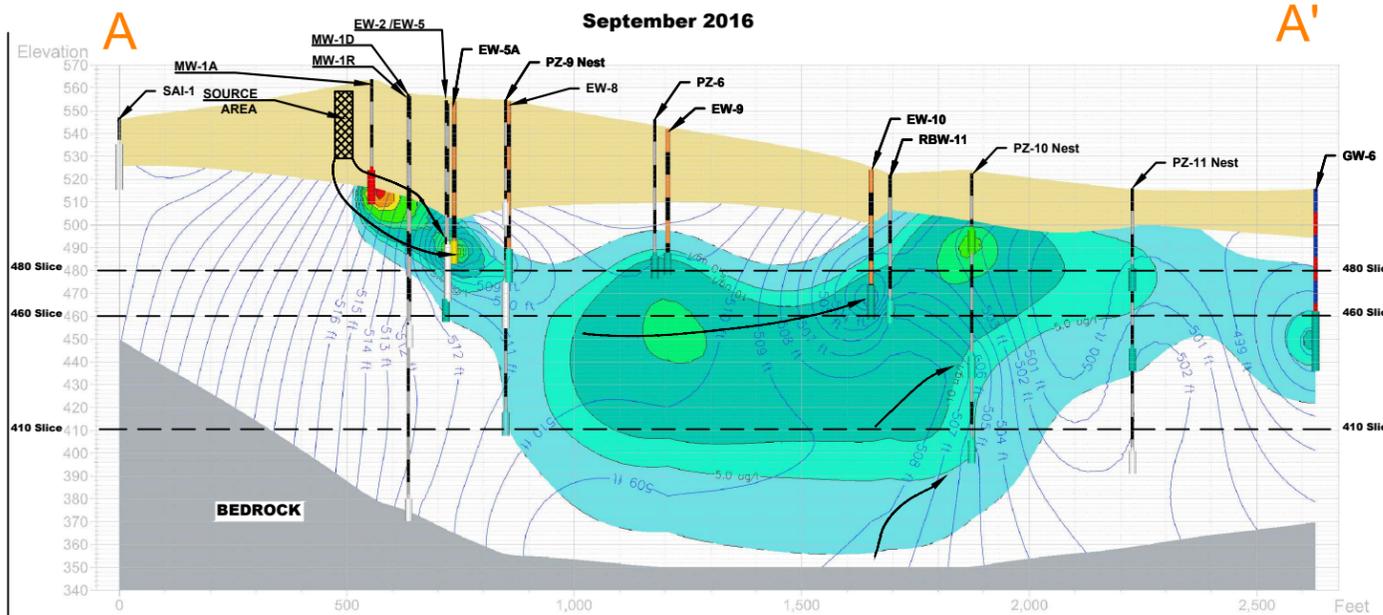
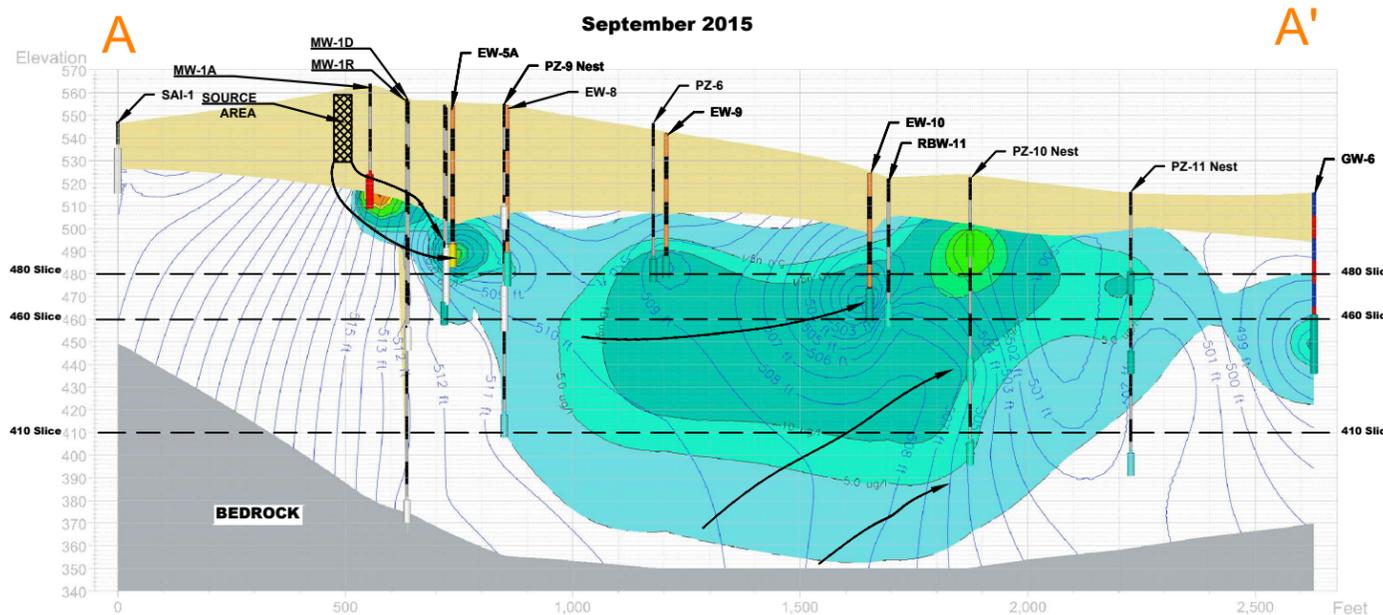
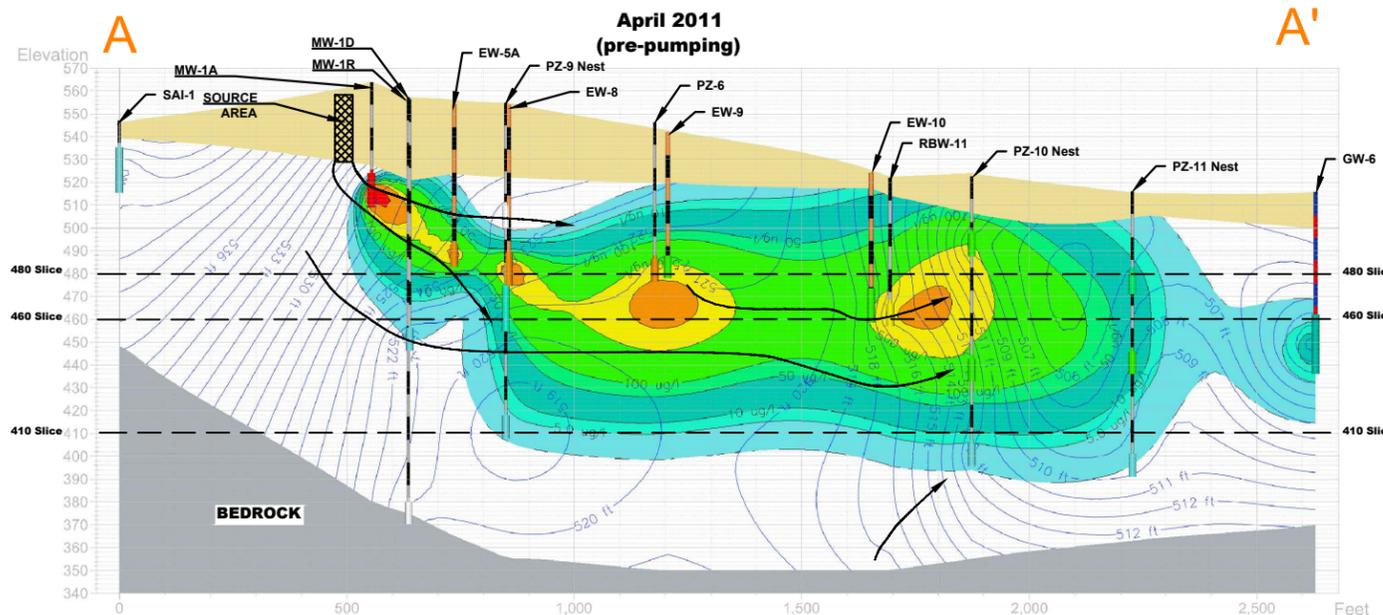
LEGEND

- ◆ - Extraction Wells
- ◆ - Municipal Wells
- ◆ - Monitoring Wells in Network
- ◆ - Monitoring Well (Not Monitored)
- Cross Section Locators
- LF - Low Flow
- NS - Not Sampled
- ND - Not Detected

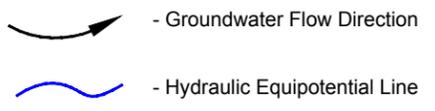


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Figure 3-1
PCE Concentrations



LEGEND

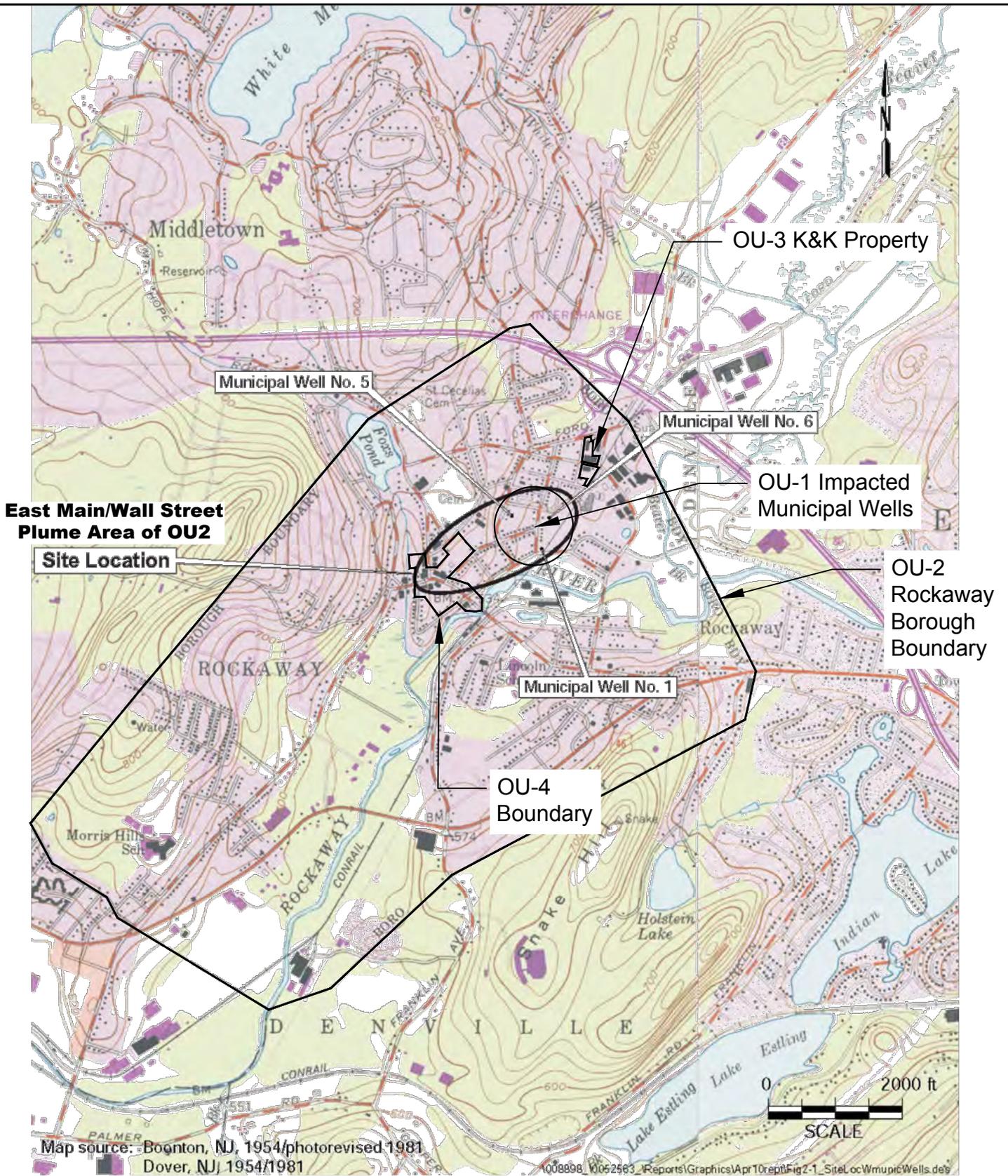


Notes:

- 1) Piezometric contours were generated by EVS 3D Kriging algorithm of measured groundwater elevation. Each well was assigned a Northing, Easting and center of well screen elevation to generate a 3D piezometric model. The model cut along the cross section line, straightened and contoured to produce a pseudo groundwater flow net.
- 2) PCE iso-concentration lines were generated EVS 3D Kriging algorithm of PCE concentration at each well to generate a 3D PCE concentration model. Model cut is along the cross section line as in the pseudo flow net.
- 3) Only limited PCE samples were collected in December 2017 and June 2018 events. The results from the previous event were used in the model for all locations not sampled during those events.
- 4) Depth to bedrock based on NJGS Surficial Geologic Map Dover Quadrangle, 1989.
- 5) GW-1 was offline during the September 2014 Sampling Event and no sample was collected.
- 6) Pumping rates are shown next to extraction wells in red.

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Figure 3-9
April 2011 and September 2015-2018 Data
Flow Nets Showing PCE Plume



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Figure 1-1
Site Location